SbW 412

1957

SPRUCE BUDWORM CONTROL

SOUTHWEST IDAHO

REGION FOUR

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

1957

SPRUCE BUDWORM CONTROL PROJECT

U. S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE

BOISE, CHALLIS, PAYETTE, SALMON AND TARGHEE

NATIONAL FORESTS

INTERMOUNTAIN REGION - OGDEN, UTAH

SPRUCE BUDWORM CONTROL PROJECT

1957

ADMINISTRATION BY INTERMOUNTAIN REGION

TECHNICAL GUIDANCE BY

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

U. S. FOREST SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

WITH COOPERATION FROM

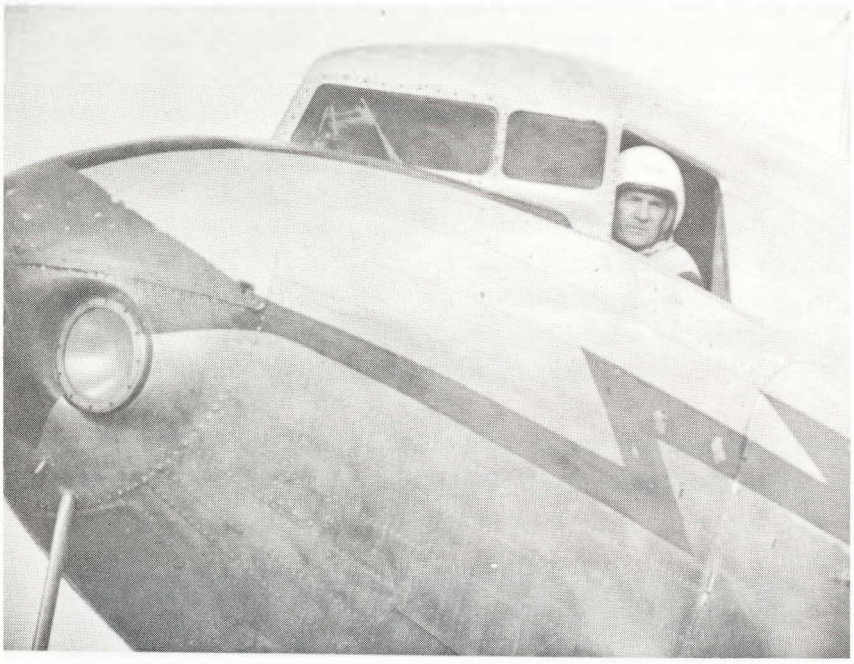
STATE OF IDAHO DEPARTMENT OF FORESTRY

SOUTHERN IDAHO FORESTRY ASSOCIATION

SOUTHERN IDAHO FOREST PEST ACTION COUNCIL

IDAHO DEPARTMENT OF AERONAUTICS

U. S. WEATHER BUREAU



FOREWORD

The third major spruce budworm control project in the Intermountain Region has been successfully completed on 660,632 acres of mixed conifer and spruce-fir forested lands of southern Idaho.

Due credit is hereby extended to all participating groups and individuals who contributed to the overall success of the control effort.

The report which follows outlines the major features of the control operation. The report is dedicated to the outstanding accomplishment of all the men, both Forest Service and contractor employees, who participated in a task that involved a difficult and hazardous job under a very isolated and primitive working environment.

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INTRODUCTION

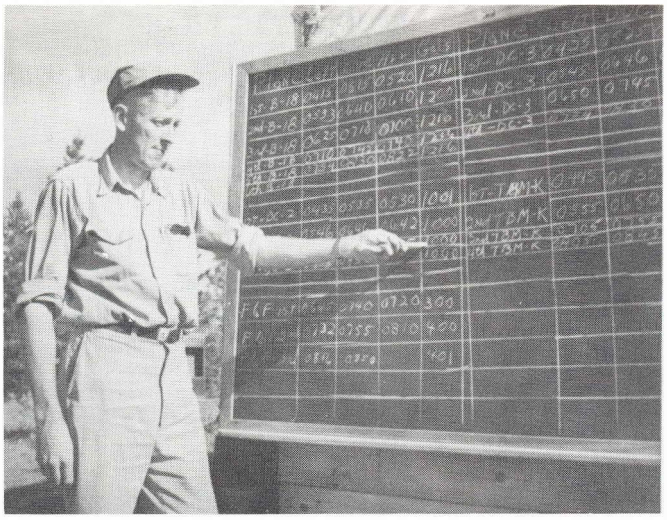
Spruce budworm (Choristoneura fumiferana) has been epidemic in many of the mixed conifer and spruce-fir forests of southern Idaho since about 1952. Active aerial control of this defoliator was initiated in 1955 in forests affected within the Intermountain Region. New areas of infestation were again sprayed from the air in 1956. Early in 1957 a decision was reached to energize a project to control a relatively mature infestation deep within the Idaho Primitive Area. As part of the same control project, an area in southeastern Idaho was also included.

Both of these areas showed strong tendencies toward continued epidemic extension. Damage within the proposed control area varied from light to very severe. Extensive stem mortality had already occurred on many of the isolated primitive areas. It was quite evident that prompt and aggressive action was required if continued damage to important land resource values was to be controlled.

Most of the proposed control area was characterized by extreme isolation, very rugged terrain, and long and difficult access for both aircraft and ground personnel. This particular aspect created additional hazards and problems of administrative difficulty that were not typical of earlier control projects in this region.

Very significant timber, recreation and watershed values were seriously threatened by this insect. Approximately five billion board feet of timber, having an estimated lumber value of four hundred million dollars, is an estimate of the timber resource alone that was directly threatened within the proposed control area. In addition, a serious burden would be placed on the fire protection organization should extensive primitive areas continue to sustain heavy budworm mortality.

Action plans to halt this infestation by aerial control were initiated early in 1957. Forest Service personnel from the Intermountain Region were assigned to the project in April. Funds for the planned control project on Federal lands were appropriated and made available by authorization under the Forest Pest Control Act. Funds for the control on state lands were made available by the State of Idaho and contributions from this source covered their full share of the costs of the control program.



The operations board was a valuable aid to unit supervisors in the daily operation of each airfield.

STATISTICAL SUMMARY

PROJECT COST		$502,080
PROJECT ACREAGE		660,632
FEDERAL	653,812	
NON-FEDERAL	6,820	
COST PER ACRE		76¢
HOURS FLOWN - ALL AIRCRAFT		750
PROJECT MORTALITY		98%
AVERAGE MILES AIR FERRY ROUND TRIP - McCall		110
Dubois		55
SPRAYING DATES - McCall	July 1 - July 25	
Dubois	July 15 - July 24	

AERIAL SPRAY CONTRACTOR - Johnson Flying Service, Missoula, Montana

INSECTICIDE CONTRACTOR - Stauffer Chemical Company, Portland, Oregon

TRANSPORTATION AND STORAGE CONTRACTOR - Interstates Service, Vancouver, Washington

ORGANIZATION

The proposed control project included portions of five national forests of the Intermountain Region. Because of this complicating factor, the regional office assumed project responsibility and designated a project director early in April. Other key personnel were also designated for project participation. Much of the early preparation was accomplished by personnel on the Payette National Forest.

Specifications for the three contracts involved were formulated early in 1957 by inter-regional conference. Bid invitations were published in March and opened in April. Delay in fund appropriations prevented contract awards until late in June.

National Forest Administration employed and supervised all project personnel. Unit biologists and insect checker personnel reported for training on June 10 and were in the field by June 15.

Organizationally, the Intermountain Forest and Range Experiment Station was given the responsibility, through the technical advisor, for technical training of the biologists and checker crews, technical inspection and control evaluation. National Forest Administration was responsible for overall supervision and direction of the control project.

The following organization chart indicates the basic organizational and functional assignments on which the project was based.

PERSONNEL ORGANIZATION CHART

SPRUCE BUDWORM CONTROL PROJECT

1957

PROJECT DIRECTOR - - - TECHNICAL ADVISOR
PROJECT SAFETY OFFICER
CONTRACT OFFICER
SUPPLY OFFICER
PUBLIC RELATIONS OFFICER
AERIAL OPERATIONS OFFICER
ADMINISTRATIVE OFFICER
C.A.A. REPRESENTATIVE
CHEMICAL ANALYST

McCall Base	Dubois Base
Unit Supervisor	Unit Supervisor
Unit Assistant	
Ground Coordinators (2)	Ground Coordinator
Unit Biologists (2)	Unit Biologist
Assistant Biologists (6)	Assistant Biologist
Insect Checkers (14)	Insect Checkers (4)
Aerial Spray Contractor	Aerial Spray Contractor
Insecticide Contractor	Insecticide Contractor
Transportation and Storage Contractor	Transportation and Storage Contractor
Aerial Observers (2)	Aerial Observer
Load Checker	Load Checker
Radio Operator	Radio Operator
Sprinkler Operator	Sprinkler Operator

PLANS

Preparation for the active aerial phase of the control project required much careful and detailed planning by project staff and other designated personnel. Many of the basic plans of past projects were adopted and/or modified to fit the current project. Specific and detailed plans included training, operation, safety, communication, and technical. All of this material was made available to project personnel and to participating forests.

Considerable logistical support in the form of supplies, materials, equipment, manpower, maps and aerial photos is mandatory in a project of this kind. This requires planned action well in advance of spraying operations.

Based upon insect development, the active air phase was ordered to begin at McCall on July 1 for two aircraft, followed a week later with five additional aircraft. The operation at Dubois was ordered to begin spraying on July 15 with three aircraft.

Original planning on this project was based upon an estimated 532,000 acres. Area extensions increased the final project acreage to 660,632. This increase in project proportions occurred after the aerial phase had begun.

Spruce budworm is a voracious defoliator and is capable of destroying vitally important national timber resource values. Control of this pest is one of the most difficult and hazardous operations confronting land managing agencies.

On contact with the insecticide the insect attempts to escape by "running away" on its web. Many desperate spruce budworm larvae are "swinging on the end of their rope" in this picture, taken immediately after spray deposition.

Vitally important to project success are the skills of capable project biologists and their crews. Their efforts determine the delicate timing of insect development and the lethal application of insecticide.

ENTOMOLOGICAL SUMMARY

Dubois Unit

Breaking of hibernation occurred on the Dubois unit about June 14. Development during the following week was extremely slow due to cold, wet weather. About June 23 the development increased to a normal rate and thereafter it was not uncommon for the percent of third instar to drop from 30 to 20 in two days.

The 36 spray blocks within this unit, ranging in elevation from 6,000 to 8,500 feet, were divided at the 7,000 foot contour and released by priority. Actual determination of this upper elevational limit was established by aircraft altimeter. All blocks, with the exception of one, were checked for larval development in both elevational zones.

Mortality sampling was based upon the sequential sampling system. Spray deposition was checked using the customary spray deposit card lines. Eighty-seven percent of all the spray blocks contained either mortality lines and/or card lines. Sequential sampling indicated this unit received a ninety-five percent reduction in the spruce budworm larval population.

McCall Unit

Spruce budworm broke hibernation below 4,700 feet on this unit on May 29. During the entire operation, larval development within the unit was rather abnormal and very erratic. All instar, second through sixth, were represented in the majority of larval development samples. This situation made the timing and release of spray blocks extremely difficult. In many instances, at the lower elevations adjacent to the Middle Fork of the Salmon River, the extensive rocky areas acted as incubators and caused phenomenal increases in larval development within the timbered extensions.

Seventy-one percent of the total spray blocks in this unit had mortality and/or card line sampling. These blocks ranged in elevation from 3,500 to 9,000 feet. Based upon the sequential method of sampling, this unit received a reduction of budworm population of between ninety-five and one-hundred percent. Overall project mortality was ninety-eight percent.

Safety in a project of this kind is intricately involved with people and machines. One of the most important hazard reduction areas is the maintenance, by key personnel, of a relaxed, low-pressure job atmosphere. This is especially true of the flying and supervisory personnel.

Safety is also intimately concerned with round-the-clock inspection and mechanical care of all aircraft.

A prediction of the safety performance of air crews can be readily determined by the care and efficiency of the ground maintenance complement.

SAFETY

In an aerial operation of this kind, safety planning occupies a position of extreme importance. A detailed safety plan covering both the ground and the air phase was prepared and vigorously applied. The project safety officer was considered one of the most important project staff positions.

Because of the isolated checker crews, the ground coordinator position was created to train and follow up on the safe working and living patterns of these remote crews. Training in horsemanship and ground and work hazards was given to all the ground personnel prior to field assignments. A definite effort was made to select and fit individuals to their particular field locations. The principle of working safety committees was used in both ground and air organization.

In a program that involves early working hours, extreme noise and the fast action that accompanies air activity, one of the most important contributions to a safe working atmosphere is the tone with which particular individuals personally carry out their jobs. One of the most valuable safety assets on a project of this type is a cool and efficient attitude maintained by such key personnel as the unit supervisor and the chief pilot. This characteristic, coupled with a sense of humor, is priceless.

Types of aircraft used in aerial control programs are changing quite rapidly. Generally, this change is reflected in terms of "heavier and faster." Continued heavy pounding of airstrips by these larger and heavier planes places certain restrictions on airstrips and airstrip maintenance if safe aerial operation is to exist.

With active cooperation from the Village Board of McCall, the Forest Service placed a thousand feet of two-inch oil mat on one inch of crushed rock and packed a six-hundred foot extension beyond this of crushed rock. This effort was very successful in providing a safe runway surface for operation of the large aircraft used at this base. To control the dust hazard both operating bases employed a water sprinkler daily. This tanker was employed on a eight-hour shift just prior to air operations.

The control project had no pilot lost time injuries. One aircraft was slightly damaged on the ground due to pilot failure. One of the contractor personnel suffered a chipped bone in an elbow injury when he slipped and fell off an airplane wing. One aircraft blew a plastic hose fitting in the hydraulic system while airborne. The pilot, despite vision impairment caused by insecticide in his eyes, brought his TBM safely back to base. One insect checker suffered a lost time injury due to carelessness around a camp cooking stove.

Such accidents are indicative of the hazardous nature of an aerial project of this type. That only these minor mishaps occurred after approximately 750 air hours of flying time and 18,000 man hours of project ground time is indicative of a high degree of safety program acceptance by both Forest Service and contractor personnel.

Suitable airstrips for operation of large spray aircraft is mandatory for safe aerial operations. And . . .

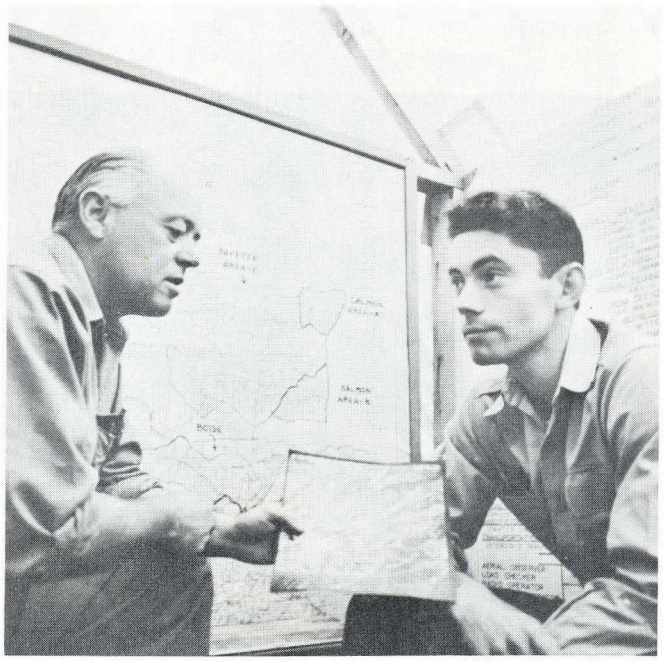
. . . safety maintenance also includes fire protection and many hazard-reducing devices, including ground clamps during refueling operations.

CONTROL UNITS

The control project was organized to operate on bases at McCall and Dubois, Idaho.

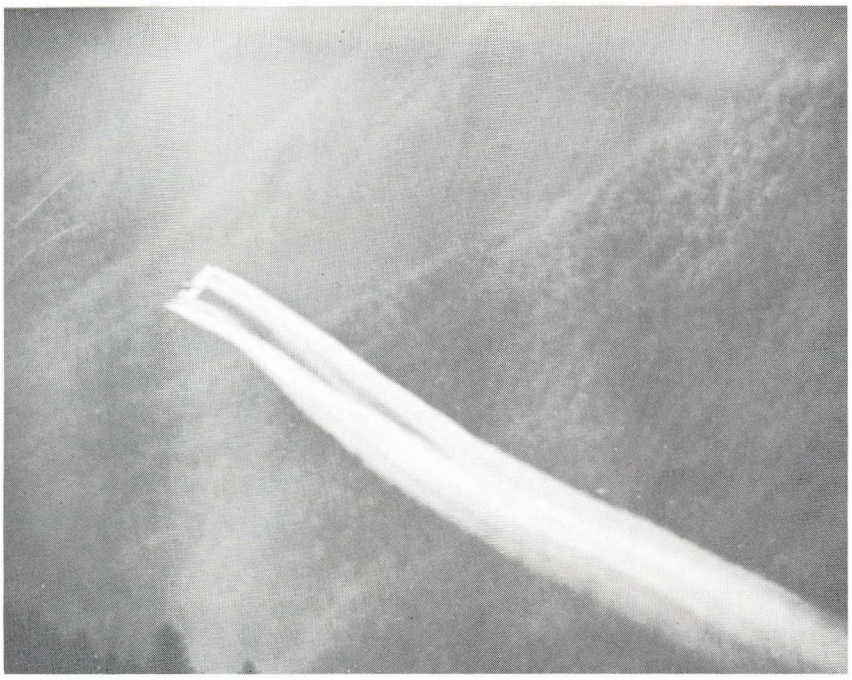
The McCall base, operating with seven large spray aircraft and two aerial observer planes, sprayed a total of 542,267 acres. The majority of this job was located in remote primitive areas. Insect checker personnel, unit biologists and assistants, were placed in seven camps throughout the project area. Where possible, these camps were located on existing airstrips and established facilities for easier access and communication.

The Dubois unit, with three aircraft and one aerial observer sprayed a total of 118,365 acres. The ground crew, consisting of one biologist and four insect checkers, was located within the project area. The access on this unit was relatively easy.



Project control of aerial spray operations included the close working relations of unit supervisors and aerial observers. Aerial observers were in the air during most of the actual spraying time.

Rough spray terrain and the effective, former Navy torpedo bomber, the TBM.



Spray ribbon of the single-engine Navy Hell-Cat.

AIRCRAFT, EQUIPMENT AND SUPPLIES

Johnson Flying Service of Missoula, Montana was awarded the flying contract. The following table summarizes the aircraft which this experienced contractor used on the project. Johnson Flying Service averaged more than 31,000 spray acres per day with a top production of 48,461 acres on July 16.

Stauffer Chemical Company of Portland, Oregon was low bidder for the insecticide contract. A satisfactory delivery pattern was pre-arranged with this contractor so that adequate supplies of insecticide would be available for field operation.

Interstates Service Company of Vancouver, Washington was the successful bidder for the transportation and storage contract. The field storage capacity of 62,500 gallons was installed at the McCall base for the expected heavy demand at that field. The Dubois base had storage for 25,000 gallons of insecticide. Six inch, all-metal lines were piped from the storage tanks to five loading stations at McCall. With two large pumps, this plumbing system assured fast delivery of insecticide to spray tanks of waiting aircraft.

Effective use of a McCall based helicopter in the transportation of men and equipment was an important contribution to the project organization. This machine served very efficiently in strengthening project channels of communication and personal contact. It served also, along with smokejumper personnel, as a first line emergency reserve mobilization unit.

Water sprinkling occurred at each operating base during the eight hours preceding 4:00 a. m. each flying day. Some mowing and rolling was also done at each base. A one-thousand foot, two-inch oil mat, underlain with one inch of crushed base course material, was laid on the airstrip at McCall. An additional six-hundred feet of crushed material was rolled and graded at this airstrip. This treatment proved very satisfactory under heavy use by spray aircraft.

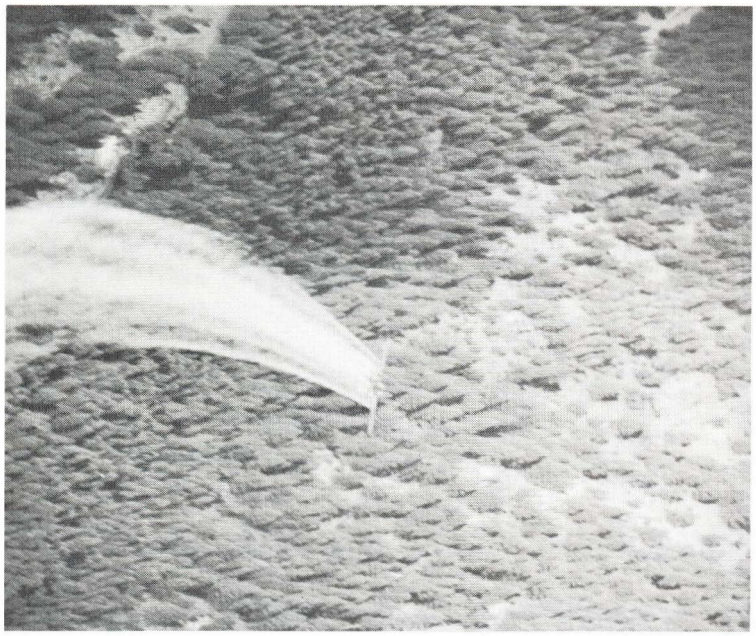
AERIAL OPERATIONS SUMMARY

McCall Based Aircraft

Pilot	Type Aircraft	Max. Load	Swath Width	Spray Speed	Hours Flown	Percent Time Airborne	Percent Acres Gallons
Bob Clark	DC-3	1200	500	150	85	94	23
Ralph Kelley	B-18	1200	500	150	94	90	24
Kenny Roth	DC-2	1000	500	150	90	86	18
Jim Larkin	TBM	700	400	170	67	84	12
Jerry Jeldness	F6F	500	250	170	75	83	12
Dick Swift	F6F	500	250	170	45	75	5
Ed Thorsrud	TBM	700	400	170	39	43	6
Dubois Based Aircraft							
Ralph Rensink	TBM	700	400	170	32	64	37
Ed Ball	TBM	700	400	170	31	62	32
Bob Waltermire	TBM	700	400	170	26	52	31
Hours flown all aircraft (Spraying)					584		

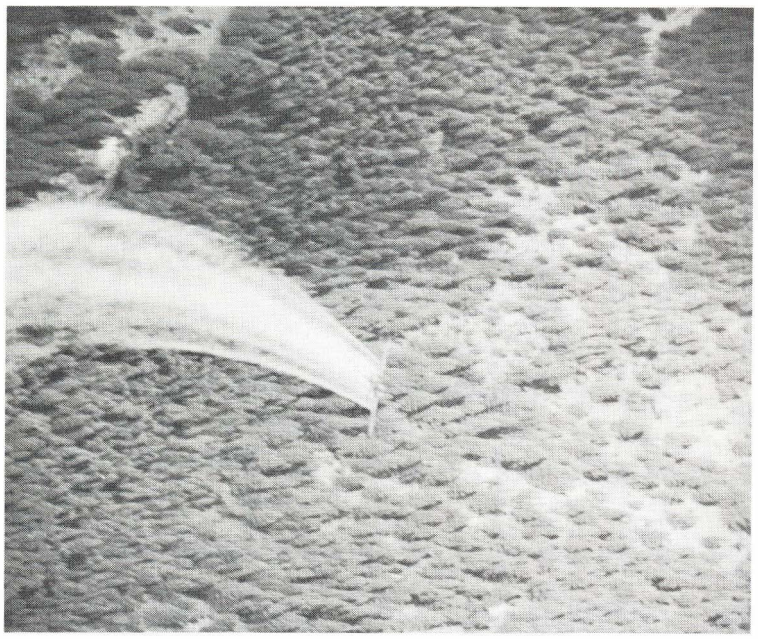
An indication of the mechanical condition and the efficiency of ground and air crews is revealed in performance of the top three aircraft at McCall. These planes were airborne an average of 90 percent of the maximum time possible and were responsible for 65 percent of the total gallons sprayed from this base. This, too, is a reflection of the unusually fine weather conditions that prevailed during the operation at this base.

One TBM required a complete engine change and was out of service the last ten days of the project. One F6F was low on production due to various mechanical difficulties and a shorter operation period. The variation in production among the Dubois aircraft is due primarily to differences in actual loads carried by each pilot and faster pilot spraying techniques. Wind conditions reduced the effective spray day approximately 30 percent at the Dubois base.



The DC-2 laying down a dense and stable spray swath in rugged terrain.

Capable pilotage and excellent equipment allowed these large aircraft to get close in. One-thousand gallon loads and good ferrying speeds added up to excellent aircraft performance characteristics.



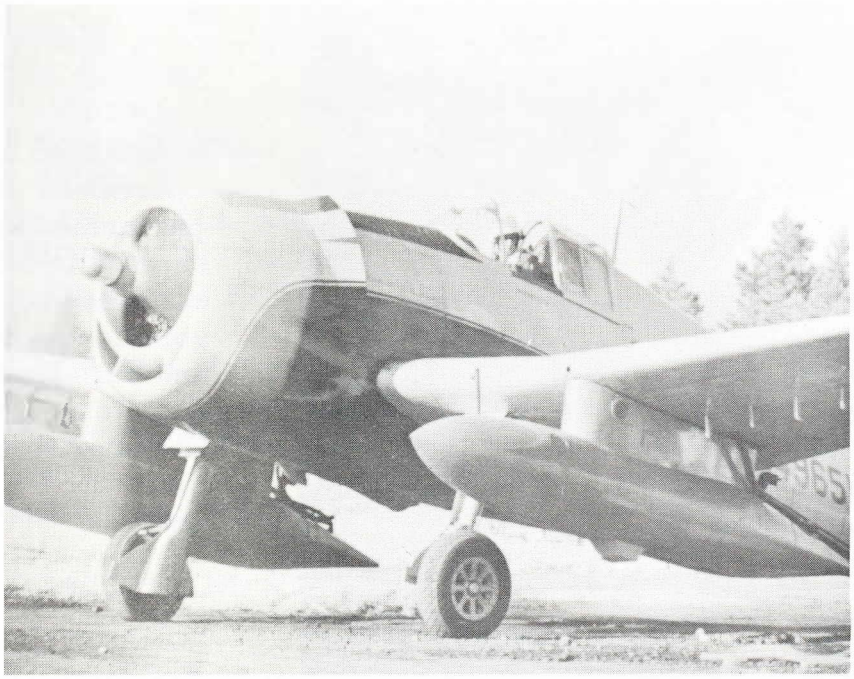
The DC-2 laying down a dense and stable spray swath in rugged terrain.

Capable pilotage and excellent equipment allowed these large aircraft to get close in. One-thousand gallon loads and good ferrying speeds added up to excellent aircraft performance characteristics.

A helicopter, based at McCall under Forest Service contract, was a very important tool in maintaining channels of communication, supply, and personal contact with far-flung organizational field units.

A qualified aerial operations officer performed valuable service in aircraft calibration and inspection of planes and personnel. The airfield at McCall was used to swath check the F6F Hell-Cat.

The TBM, carrying loads up to 700 gallons and having spray speeds from 160-170 MPH, proved to be a very effective spray plane. It is particularly adapted to longer ferries and long, sweeping spray terrain.



The F6F Hell-Cat carried loads up to 500 gallons and had a restricted swath width of 250 feet. It was calibrated to spray at 170 MPH and was capable of returning to base at a speed of 260 MPH.

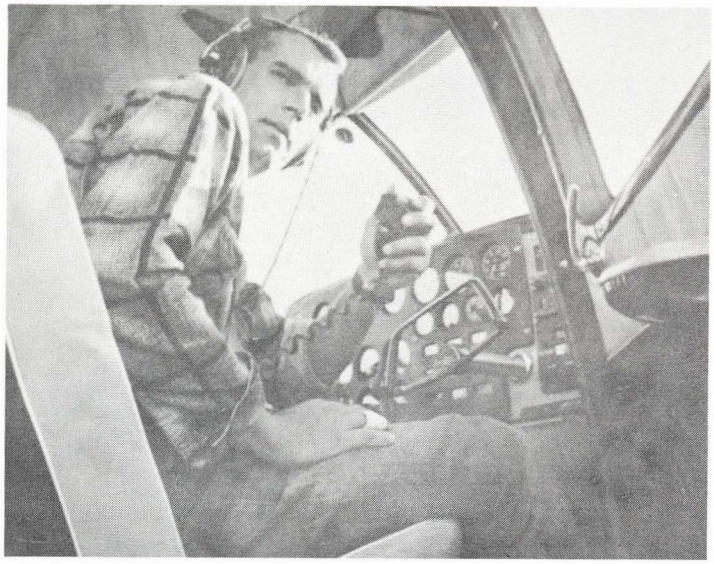
COMMUNICATION

Basic communication between the isolated insect checker crews and the unit biologist was SPF radio. In somecases these crews also had telephone facilities. Communication between unit biologists and the unit supervisor was either SPF or VHF radio. The unit supervisor had both radio frequencies and commercial telephone at his base of operations.

Communication between the aerial observers and the unit supervisor was VHF radio.

Due to forestwide communication problems at the outset of the spray project, the overall communication problem soon became critical. Detail of a full-time regional radio technician to service the project communication nets promptly alleviated this situation.

Actual fire control activities had higher air priority, and a conflict in use, not of serious consequence to the spray operation, developed when an early morning dry electrical storm scattered numerous fires across forested areas of southern Idaho.



Effective communication between aerial observers and the unit supervisor was a very important air-ground link. It was found necessary to have a qualified radio technician on project assignment to keep this equipment functioning properly.

Storage capacity of 62,500 gallons, 6-inch plumbing to five loading stations, large pumping facilities -- with an auxiliary, and a capable maintenance mechanic efficiently served the seven large aircraft at the McCall base.

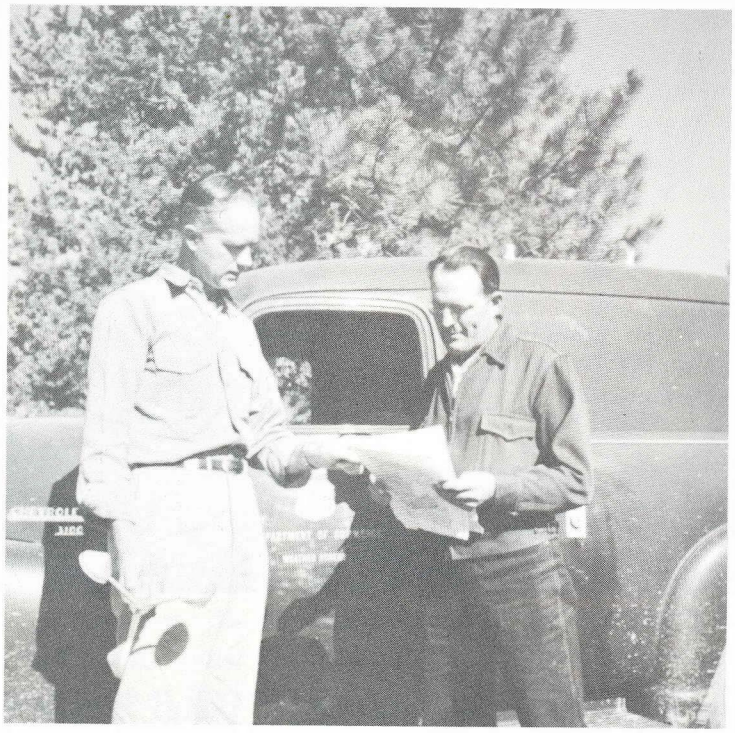
Mobile trucking service from Boise kept the operating fields supplied with insecticide despite the continuous and heavy demand of the spray airplanes.

COOPERATION

Cooperation and encouragement was received from the State of Idaho Departments of Forestry and Aeronautics, the Southern Idaho Forest Pest Action Council, the Idaho Fish and Game Department, the Agricultural Research Service, and the U. S. Weather Bureau.

The Agricultural Research Service conducted a training school prior to the start of the project which familiarized aerial operation officers in techniques of swath checking, calibration, and inspection of aircraft and personnel. This was an important contribution to the project accomplishment.

The U. S. Weather Bureau furnished observation equipment and provided daily weather forecasts for each control unit.



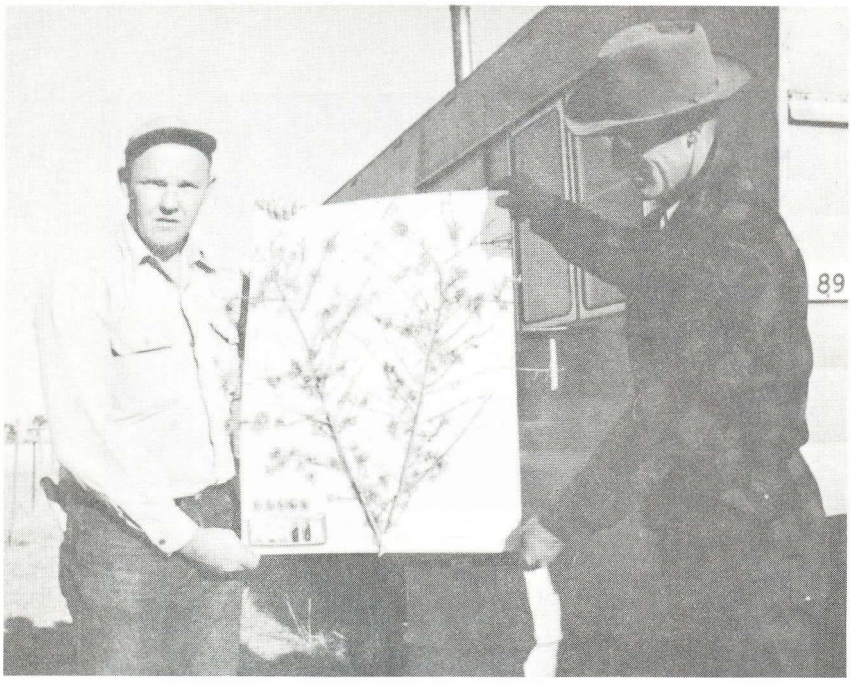
The U. S. Weather Bureau furnished wind and other weather information for the daily early morning aerial operation. This facility used the existing fire weather reporting channels on national forest areas immediately adjacent to the spray units.

PUBLIC RELATIONS

An informational leaflet concerning the overall aspects of the project was prepared by the regional office and made available for general public distribution early in the project.

Widespread newspaper and radio contacts were made by the public relation office. Personal contacts with individuals and selected groups were also made during the active phase of the project.

The training film "Attack from Above" was a very useful informational tool, pre- and post-project.



Small displays of damage, samples of the instar stages of the insect, project literature, and show-me trips were valuable aids in maintaining a public relation program at each operating base. This display was also found to be of interest to project ground and air personnel.

competitor. Flying contractors find it difficult to meet this type of "package" competition, and some of our best flying contractors do not intend to diversify their organization to include insecticide or transportation.

8. Our spray programs now have been with us so long, many of our better spray pilots are 50 years old or more. This problem indicates possible need for a more rigid physical examination for all spray pilots prior to actual spray operations to catch some of these developing poor risks.

9. Fiscal year fund accounting is particularly burdensome for aerial control projects. Administration would be greatly simplified if accounting could be on a continuing year basis.

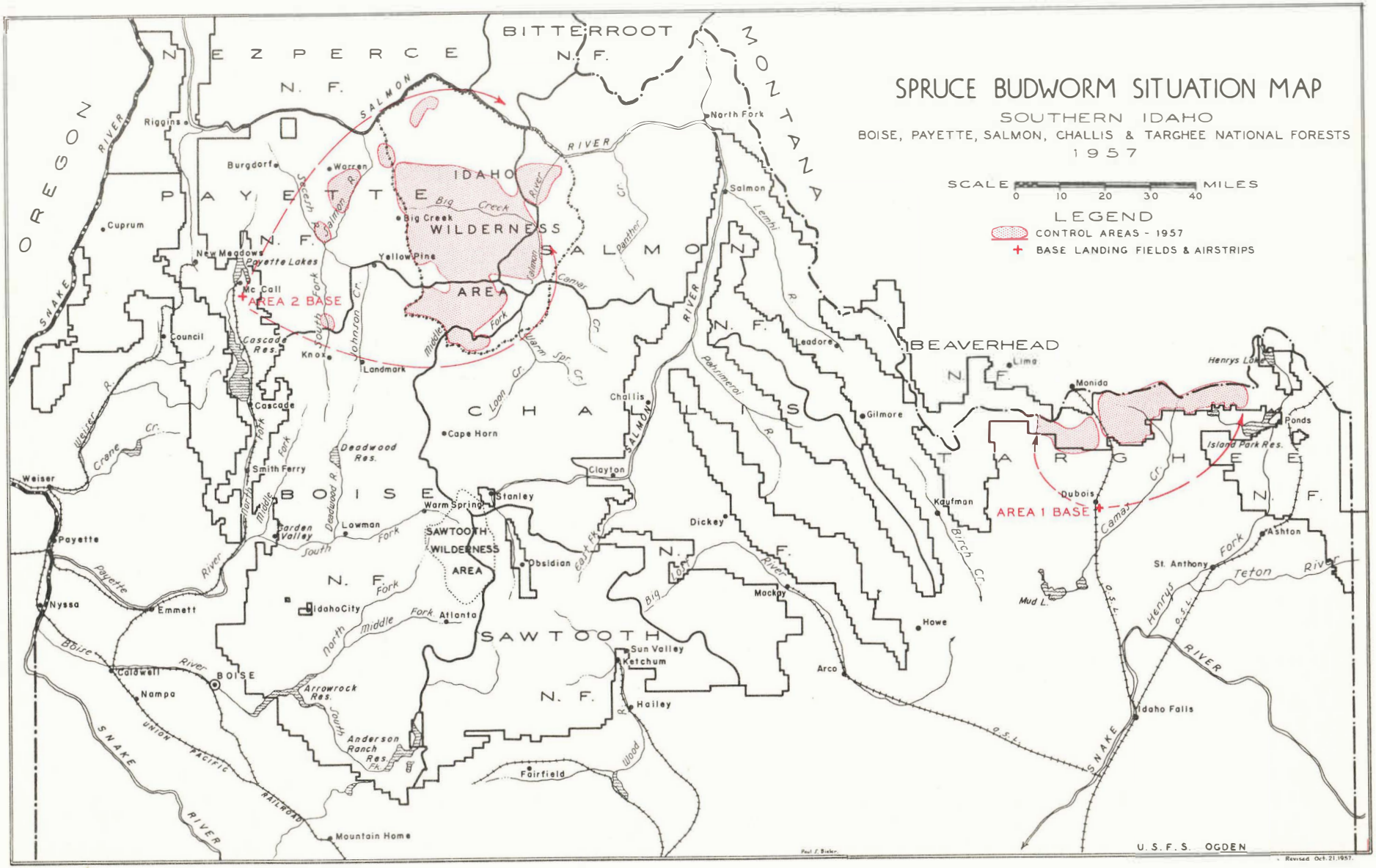
10. On a project that does not have a top-rate flying contractor, the need for a full-time aerial operations officer, well qualified in aircraft inspection and pilot qualification, would be imperative. This is a very important hazard reduction area and should not be slighted in any respect.

11. The complication of isolation and long line of service and supply that characterized this project warrants a full-time radio technician. This should be planned for in initial project organization.

12. Forest supervisory personnel should be urged to take more advantage of the fine training opportunities that the usual control project offers. Many of the techniques involved in an active fire control organization, such as air supply, terrain recognition, aircraft limitations and performance are found in spray projects.

13. Weather determines to a large extent the actual production of the spray aircraft. An accurate forecast of weather conditions, pre-project, would allow project administrators to better plan needed spray aircraft power and to avoid the very critical buildup of insect development and safety hazard pressure. This is another important hazard reduction area. To gain this operation margin, it may be necessary to obtain specially tailored meteorological information from special forecasters well in advance of actual project activation. The present source of weather information is not geared to provide this type of service.

14. Biologists and assistant biologists are faced with a tedious and time-consuming task in the present method of insect classification. A big lift to this important project activity would occur if a simple and accurate method of insect classification could be devised to allow crew members to perform this task.


SPRUCE BUDWORM SITUATION MAP
SOUTHERN IDAHO
BOISE, PAYETTE, SALMON, CHALLIS & TARGHEE NATIONAL FORESTS
1957
SCALE 0 10 20 30 40 MILES
LEGEND
CONTROL AREAS - 1957
BASE LANDING FIELDS & AIRSTRIPS
AREA 2 BASE
AREA 1 BASE
IDAHO WILDERNESS AREA
SAWTOOTH WILDERNESS AREA
BITTERROOT N.F.
NEZPERCE N.F.
PAYETTE N.F.
BOISE N.F.
SAWTOOTH N.F.
CHALLIS N.F.
BEAVERHEAD N.F.
TARGHEE N.F.
OREGON
MONTANA
Riggins
Cuprum
New Meadows
Payette Lakes
McCall
Council
Cascade
Cascade Res.
Knox
Landmark
Yellow Pine
Big Creek
Warren
Burgdorf
North Fork
Salmon
Leadore
Lima
Monida
Gilmore
Challis
Cape Horn
Clayton
Stanley
Warm Springs
Dickey
Obsidian
Mackay
Howe
Arco
Sun Valley
Ketchum
Hailey
Fairfield
Smith Ferry
Deadwood Res.
Lowman
Garden Valley
IdahoCity
Atlanta
Weiser
Payette
Nyssa
Emmett
Caldwell
Nampa
BOISE
Arrowrock Res.
Anderson Ranch Res.
Mountain Home
Kaufman
Dubois
Mud L.
Ponds
Island Park Res.
Henrys Lake
Ashton
St. Anthony
Idaho Falls
Teton River
Henrys Fk.
Big Lost River
Birch Cr.
Camas Cr.
Pahsimeroi R.
Lemhi R.
Panther Cr.
Warm Spr. Cr.
Loon Cr.
Johnson Cr.
Crane Cr.
Salmon River
Snake River
Boise River
Payette River
Deadwood R.
South Fork
Middle Fork
North Fork
East Fk.
Wood R.
Union Pacific Railroad
O.S.L.
U.S.F.S. OGDEN
Revised Oct. 21, 1957.